

A GNN approach for events-characters linking across documents in TTRPGs



The problem & The Goal

Our project focuses on predicting the roles of characters in a story and extracting the Story Dynamic.

Our solution construct a graph of events and characters, and uses GNNs to exploit the graph informations.



Dataset - The Summaries



The transcripts for Campaign 1-2 consist of 7.68 million words, equivalent to 153 books.

The summary of one transcript is approximately 4,908 words, which is around 17% of the raw text, or 26 books.

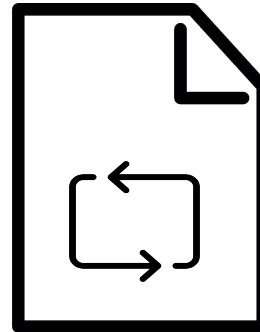
Transcripts



Summaries



Recap



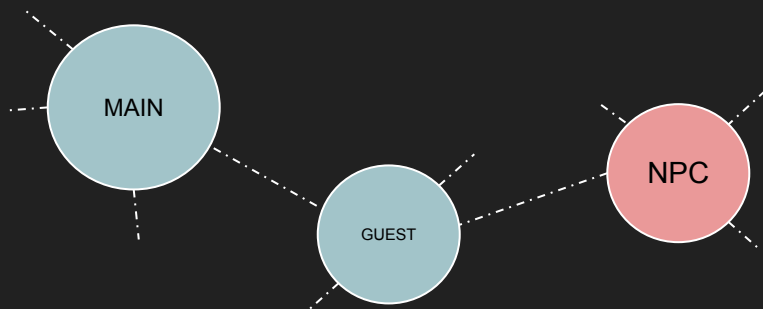
Timeline



Dataset - The Characters

Our data contains detailed information about the characters in a fictional work, including their roles in each episode and their relationships with other characters.

You can explore the complex web of relationships between the **Main**, **Guest**, and **NPC** characters, as well as their role in the story as either **Allies** or **Antagonists**.



Dataset - The Events

The ground truth for events will be extracted from the Timeline and Recap of Previous Episodes.

4 Duscar (Day 51)

"Stoke the Flames" (1x30)

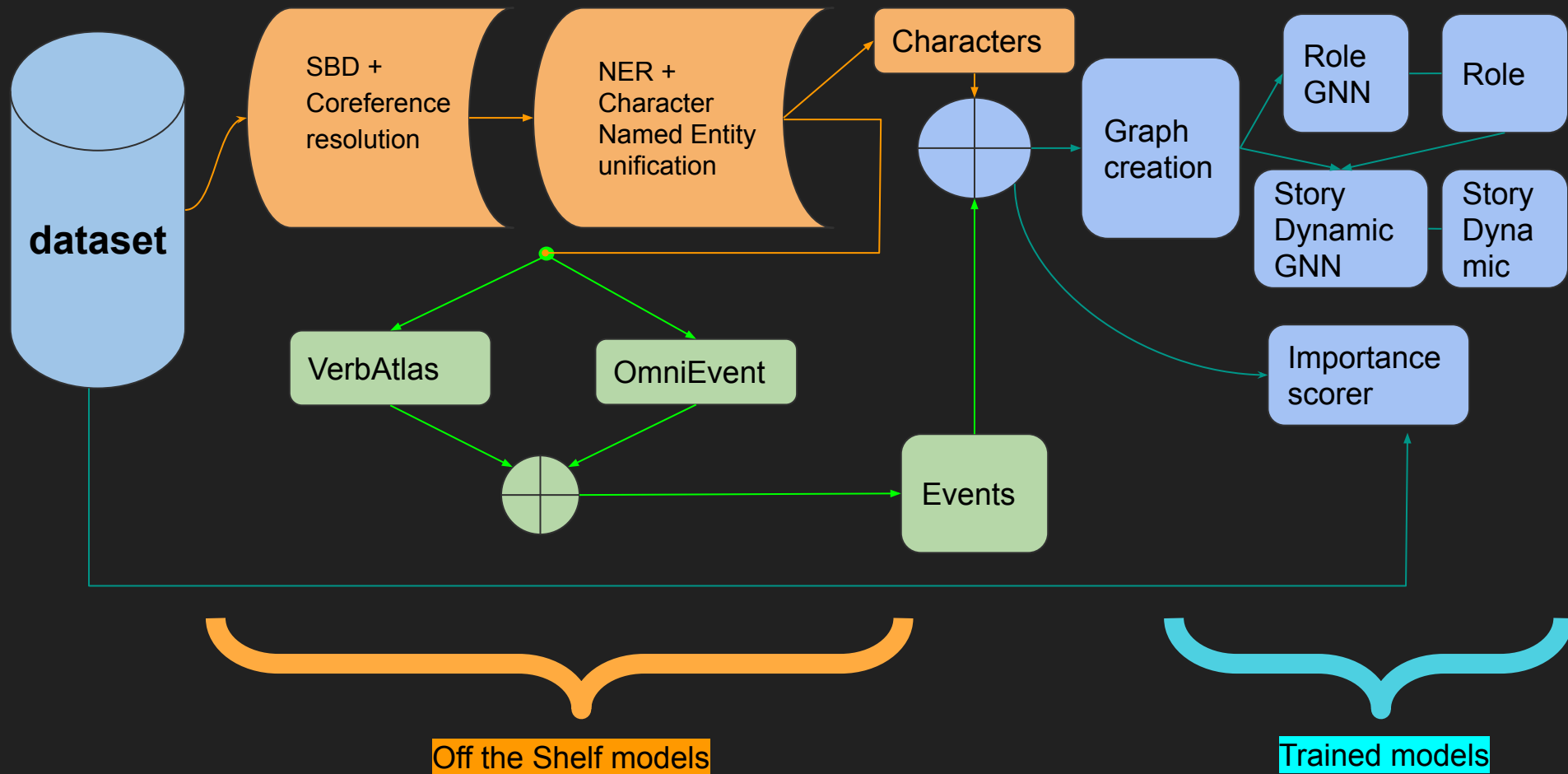
at 1:31:38

- Scanlan burnt down the mansion of [Goran Vedmire](#).
- Vox Machina killed [Count Tylieri](#).
- An avatar of Pike appeared and helped her comrades fight off a horde of undead.

Previously on *Critical Role*

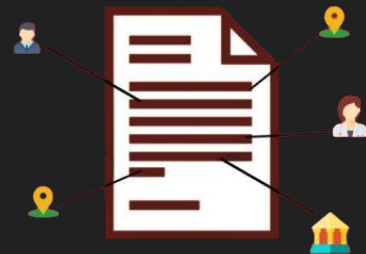
"The party has traveled to [Whitestone](#),

Pipeline - schema



Character Extraction

- First sub-task for Character-Event graph building
- Sentence Boundary Detection
- Upstream task: Coreference resolution
 - link pronouns and name to Entity.
- Named Entity Recognition
 - Transformers based
 - Filtering for 'Person'
- Character Named Entity unification:
 - rule based
 - system execution: unification with ongoing graph
- Output: new processed text.

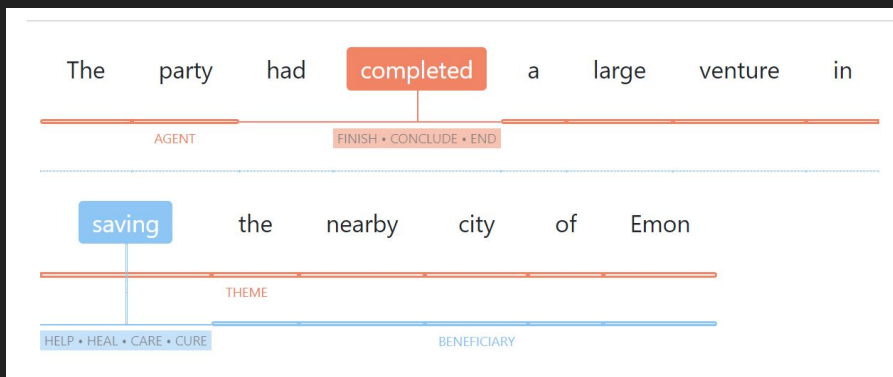


Percival Fredrickstein von Musel Klossowski de Rolo III, often known simply as **Percival de Rolo** or **Percy**, is a **human gunslinger** member of

Event Extraction

- Second sub-task for Character-Event graph building
- Different possibilities for Semantic Role labeling:
 - Rule-based approach
 - VerbAtlas
 - OmniEvent

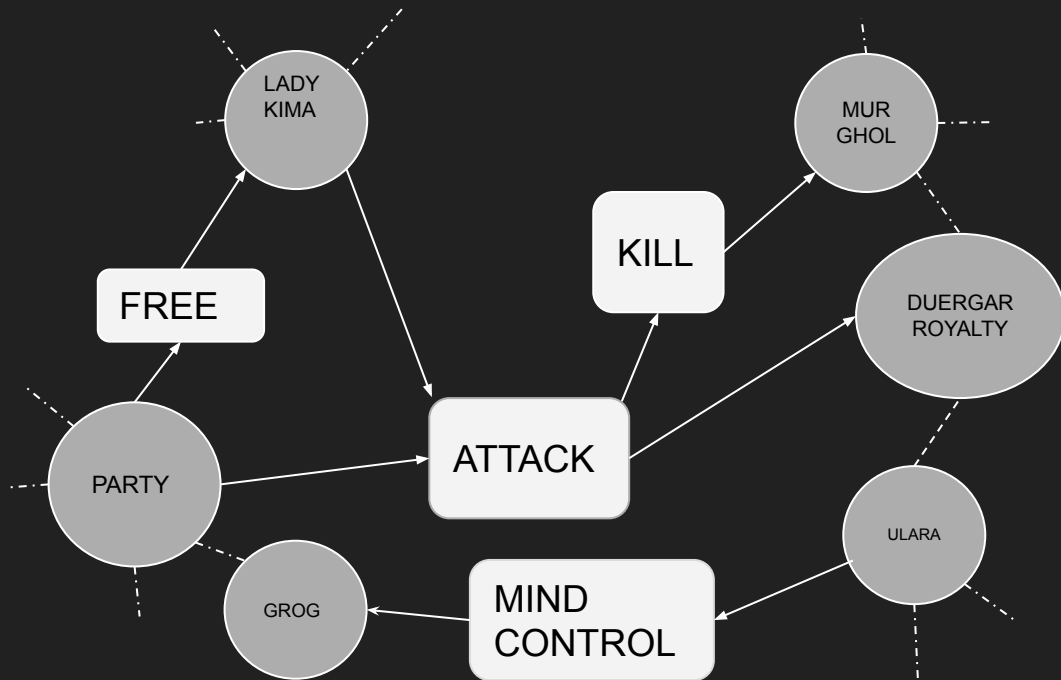
VerbAtlas




Graph creation

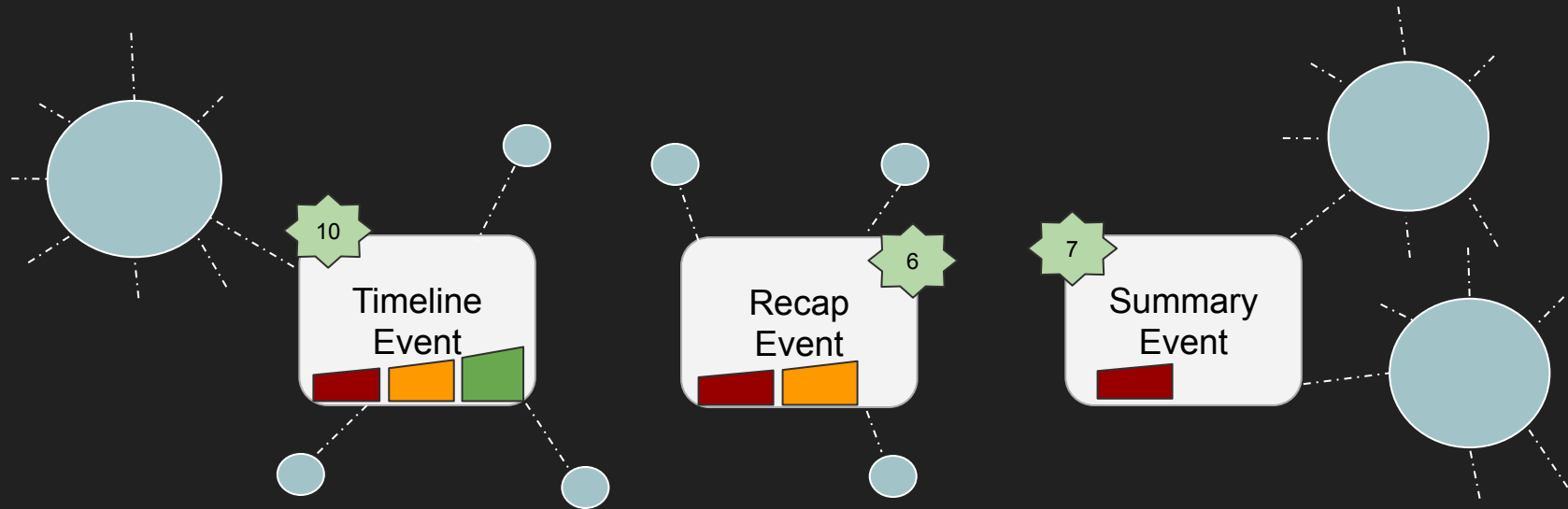
From the timeline

The party freed Lady Kima of Vord and together attacked the duergar royalty in the throne room, killing King Murghol. Queen Ulara flooded the room with lava and fled with a mind-dominated Grog among her party.



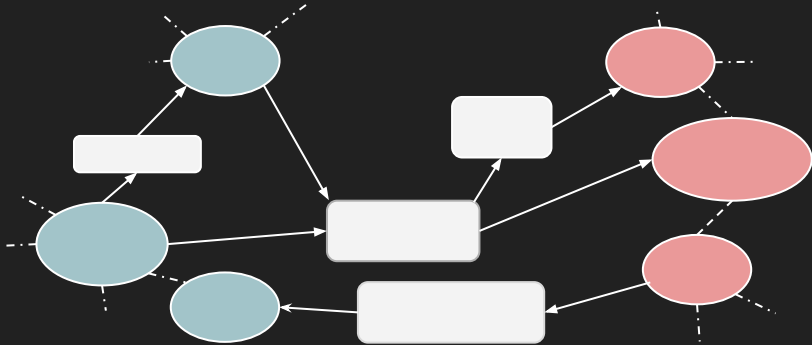
Importance scorer

Events are scored() on the base of their connection, weighted by their origin 

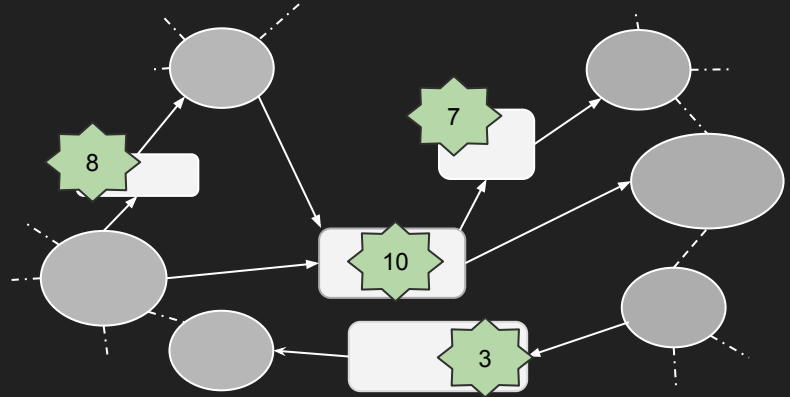


Solution proposed - Character Role and Event Importance prediction

Train a GNN on the graph to predict the class of each node based on its features and connections to other nodes.

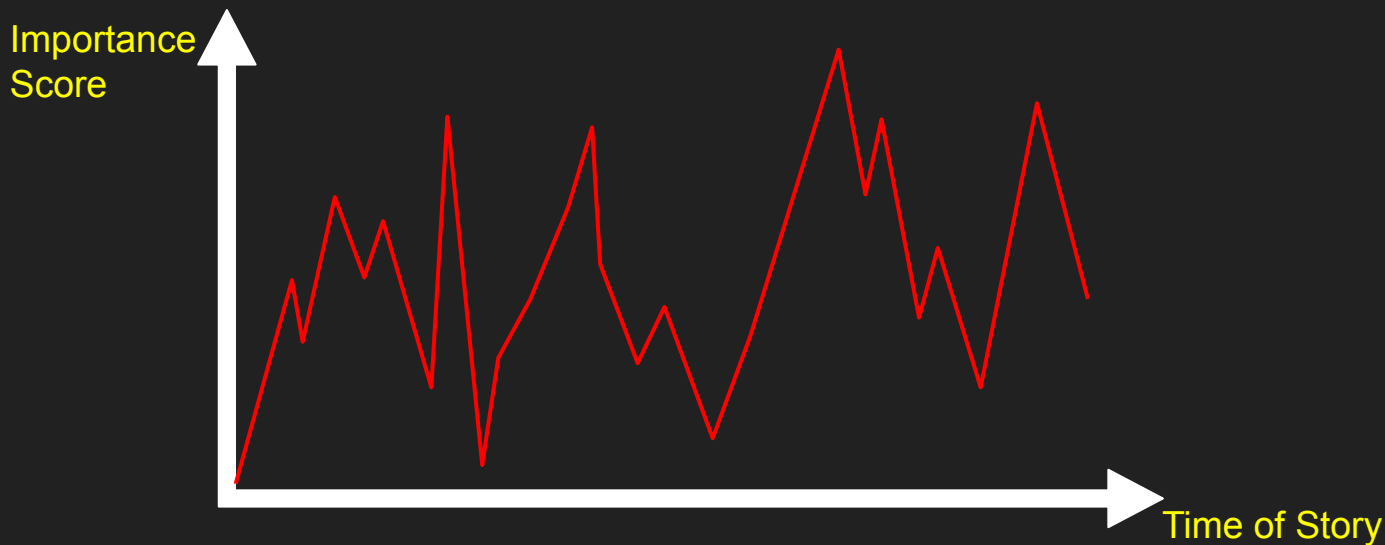


To predict the importance of events in a novel using a trained GNN, we use the network's analysis of the connections between characters and events to make predictions.



Story Dynamic

We are gonna plot the Importance Scores associated with an Event ordered following the appearance of that event in the story



Evaluation

- Ground truth extraction:
 - Principal events (Timeline + Recap)
 - Characters' role
- Quantitative evaluation: Accuracy, Jaccard Score, etc.
- Importance Score respect to Silver Labels from Graph Connections between characters and events.
- Qualitative evaluation of final results on role classification and Story Dynamic.



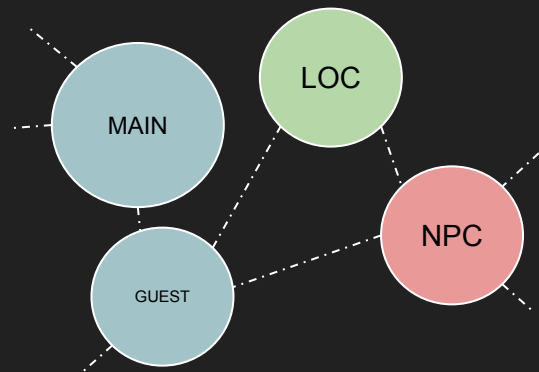
Novelties

- Building a labeled resource for improvements in the NUAnS tasks, especially for ttrpgs
- A novel approach for role classification, and Story Dynamic
- Exploitation of the use of GNNs for encoding across-document informations.



Refinements & future improvements:

- Introduce Location entities in the graph representation
- Multilingual



References

- Liu, Yinhan, et al. "Roberta: A robustly optimized bert pretraining approach." arXiv preprint arXiv:1907.11692 (2019).
- Di Fabio, Andrea, Simone Conia, and Roberto Navigli. "VerbAtlas: a novel large-scale verbal semantic resource and its application to semantic role labeling." Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and the 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP). 2019.
- F. Scarselli, M. Gori, A. C. Tsoi, M. Hagenbuchner and G. Monfardini, "The Graph Neural Network Model," in IEEE Transactions on Neural Networks, vol. 20, no. 1, pp. 61-80, Jan. 2009, doi: 10.1109/TNN.2008.2005605.
- <https://omnievent.readthedocs.io/en/latest/>